RR 01-01

Study on the Natural Rate of Unemployment and Its Changes

Chang-Kyun Chae
Tae-Yol Lee

The purpose of this study is to estimate the level and movement of natural rate of unemployment and examine more systematically the main possible explanations of its changes.

The estimates of the level and movement of natural rate of unemployment were based on two different concepts of natural rate of unemployment: 'the unemployment rate under full employment' on the one hand and 'non-accelerating inflation rate of unemployment', so called NAIRU on the other. Economists have generally analyzed natural unemployment rate based on the second concept, NAIRU. Even though this study basically begins with the same idea of the economists, it attempts to cover the other concept of the natural rate of unemployment.

The researchers began with the basic equation in which the dependent variable is inflation rate and explanatory variables are unemployment rate, natural rate of unemployment and other variables affecting inflation. Difficulty of estimation comes from the fact that one of the explanatory variables, natural rate of unemployment, cannot be observed. Different methods are applied depending on the assumptions about natural rate of unemployment.

First, it is assumed that natural rate of unemployment is constant over time. In this case, there is no variable left unobserved in the equation and simple ordinary least square can be used for estimation.

Second, the natural rate of unemployment is assumed to have random walk process. In this case, unemployment rate should be decomposed into the trend component and cyclical component, and estimated trend component becomes the natural rate of unemployment. State-space model should be applied to conduct this estimation.

Third, the natural rate of unemployment is assumed to have simple linear relationship with the change of ratio between stock and population age over 15. The idea is that if the natural rate of unemployment is 'the unemployment rate under full employment', it must have simple relation with magnitude of stock and population. Again, the state-space model is applied to conduct this estimation.

Despite the complexity and variety of estimation methods, the estimated result is quite consistent, ranging between 3.5～4.0%. This implied that if unemployment rate exists in this range, the government's aggregate demand policy for reducing unemployment could cause side effects such as inflation.

In addition, this study considered three factors among others, namely changes in the composition of the labor force, changes in industrial structure, and an increase in unemployment benefit to examine how they affected the natural unemployment rate.

First of all, changes in the composition of the labor force produced no particular effect on the changes in unemployment rate after currency crisis. The most abrupt increase of unemployment rate since 1997 has resulted from the general increase of unemployment rate in all the composing groups that make up the economically active population. However, the fact cannot be neglected that time series is too short for the changes in the composition of the labor force to be discovered.

Meanwhile, it is verified that the changes in industrial structure exerted constant effect on the natural rate of unemployment. As shown in the abrupt growth of ICT industry and drastic increase of venture corporations, the industrial structure has greatly changed around the time of the currency crisis, the so-called 'IMF era'. Increases in frictional and structural unemployment through these changes in industrial structure are raising the natural rate of unemployment. The changes in industrial structure are measured by the sectoral shift index of Lilien (1982), which means deviation of the rate of hiring growth among the industrial fields. The changes in sectoral shift index especially between the fourth quarter of 1997 and the first quarter of 1999 when sectoral shift index reached the climax can explain approximately 10-12% of the changes in unemployment rate in the same period. The effect that the changes in industrial structure have on unemployment rate is not so small, but not so great compared with that of America.

Finally, this study confirms that unemployment benefit has the negative effect of raising unemployment rate. Unemployment benefit per unemployed person has rapidly increased because the coverage of unemployment insurance has widened and the number of days of fixed allowance is added. It is proved that the changes in unemployment benefit raise the unemployment rate by the aggregate time series analysis regarding the relation of unemployment benefit and unemployment rate. The greater the replacement ratio (i.e. ratio of unemployment benefit over wages), the higher the unemployment rate.

Of course, it cannot be neglected that the government may make policy efforts to enlarge the coverage of unemployment benefit and increase the number of days of fixed allowance in order to minimize social and political unrest caused by the increase of unemployment. In fact, it is empirically confirmed that replacement ratio is enhanced by unemployment rate. Since results from the single equation is biased, 2 stage least squares method (2SLS) is applied. The estimate result shows that replacement ratio still affects the unemployment rate in the direction of the positive.

If government policy to lower the natural rate of unemployment itself is needed, the policy to minimize impact of swift changes in industrial structure on the labor market would be essential. In addition, improvement of unemployment benefit system to induce re-employment of the unemployed would be essential since it is found that the unemployment benefit could raise the unemployment rate.